LEARNING FROM INCIDENTS 25-04:
Working in the Aft Peak

The rudder system needs to be greased and the helmsman receives permission from the captain to grease the rudder system in the aft peak. When giving permission, the captain states that, following the procedure, measurements must be taken and a work permit must be filled in before the helmsman can enter the aft peak.
The meter is switched on, tested and shows 0% LEL and 20.9% oxygen. This is within the reference values, so the helmsman proceeds to the aft peak with the meter.

What happened?

The hatch of the aft peak has already been open for some time to allow natural ventilation. The helmsman goes to the aft peak and hangs the hose of the meter inside. After a short while, the oxygen drops briefly to 20.7%, then goes back up to 20.9%. The helmsman thinks the change in values is due to the meter, places the meter at the entrance and then enters the aft peak, following procedures and staying in contact with the captain.
He greases the rudders and checks the aft peak. He sees that the exhaust pipe running through, is black in one place. The helmsman reports to the captain that he has finished greasing the rudders and that the exhaust is dirty.
The helmsman notes that since he entered the aft peak, he has a headache, but does not think much of it. However, when the helmsman exits the aft peak, the headache disappears. He reports this to the captain.

Symptoms of carbon monoxide poisoning

Fortunately, this situation did not lead to an accident, however, there were signs of carbon monoxide (CO) poisoning.

Effects of CO exposure in ppm per time:

6 ppm	24 hours	Maximum allowable concentration for continuous exposure over 24 hours*
150 ppm	1,5 hours	Light headache
200 ppm	2-3 hours	Light headache, fatigue, nausea
400 ppm	1-2 hours 3 hours	Frontal headache Life-threatening
800 ppm	45 minutes 2 hours 2-3 hours	Dizziness, nausea, convulsions Unconsciousness Death
1600 ppm	20 minutes 1 hours	Headache, dizziness and nausea Death
3200 ppm	5-10 minutes 25-30 minutes	Headache, dizziness and nausea Death
6400 ppm	1-2 minutes 10-15 minutes	Headache, dizziness and nausea Death
12800 ppm	1-3 minutes	Death

Lessons learned

- Calibrate equipment according to the supplier's instructions (including leak / tightness test, zero test and battery)
- Measure and record accurately, have the ADN expert issue the work permit / risk assessment before entering the space
- Measure at different heights within the space
- Wear independent breathing protection
- Ensure effective communication
- Take emergency measures

Sources

WHO